5.0 RESOURCE ISSUES AND CURRENT AND PROPOSED STUDIES

5.1 INTRODUCTION

There are a number of ongoing studies initiated prior to relicensing. In addition to completing these studies, DWR proposes to conduct studies to evaluate the effects of the project on environmental resources. The studies should also meet the FERC licensing requirements of Exhibit E (18 CFR 4.51). This section presents ongoing studies and DWR's proposed approach to evaluation of existing project operation and identification of resource-specific issues and appropriate measures to address them. Current study plans will be discussed in the Work Groups and modified as needed to meet licensing objectives. Detailed study plans will be developed for relicensing issues raised through Work Group and plenary meetings. Proposed studies presented in this section are therefore preliminary and based on information obtained and issues identified to date.

5.2 WATER QUALITY

The DWR has been monitoring temperature changes in the Feather River, the Thermalito Afterbay, and the Thermalito Forebay. A river temperature model developed by UC Davis has been completed that will provide Oroville Project operators with more information on how specific water releases will affect temperatures throughout the Lower river and the likely impact of the temperature on river fisheries, recreation, agricultural diverters and the hatchery operations.

5.3 AQUATIC RESOURCES

5.3.1 Issues Associated with Hatchery Operation

There are several issues associated with operation of the Feather River Fish Hatchery. These issues will be explored further as DWR goes through the FERC relicensing process and are being addressed by existing discussions between DFG and NMFS. Some of the more significant issues needing resolution include:

- The degree to which mitigation-hatcheries add to the restoration of a natural ecosystem.
- The degree to which planting production fish, and experimental releases, outside the Feather River basin may have lead to increased straying and associated genetic impacts.

- The degree to which overlap in spawning and hatchery practices may have lead to interbreeding between the two runs and some loss of genetic fitness. The dam caused the spring and fall runs to spawn in about the same geographic area and about the same time. They were formerly geographically isolated, with the spring-run spawning high in the watershed and fall-run spawning near the foothills.
- The degree to which salmon production from the Feather River and other hatcheries may have allowed high ocean harvest rates – harvest rates that could not be sustained by natural runs.
- The degree to which the reservoir stocking plan should be adjusted due to the finding of a serious salmon disease, IHN, in Lake Oroville. There is concern that planting Feather River Fish Hatchery salmon in the reservoir may exacerbate disease problems in the hatchery. In 2000, there was a severe IHN outbreak at the hatchery, resulting in the loss of several million juvenile chinook salmon.

5.3.2 Lower Feather River Issues and Current Studies

5.3.2.1 Steelhead Snorkel Surveys and Habitat Inventory

In 1999, the DWR focused on determining where juvenile steelhead rear and on determining their relative abundance above and below the Thermalito Afterbay Outlet. Additionally, the DWR identified the types of habitat that juvenile steelhead prefer and their relative availability within the river. Side (secondary) channels within the Low Flow Channel were identified as high density rearing areas. Research on juvenile steelhead rearing will continue in 2001.

Snorkel surveys are also being conducted to monitor adult steelhead in the river. The goals are to identify migration timing, identify the number of naturally spawning fish in the population, and locate preferred spawning grounds. Preliminary information suggests that there may be two separate runs of steelhead in the Feather River, one in the winter and one in the spring/summer.

As part of our steelhead and salmon studies, the Geographic Information Center at Chico State mapped the riparian vegetation of the Feather River. This provides a general overview of the status of the riparian forest but does not provide the small-scale data needed to determine what type of cover is available for steelhead. Therefore, we are mapping the river's microhabitats to quantify the amount and quality of riparian habitat available for juvenile steelhead rearing.

5.3.2.2 Beach Seine Surveys

Beach seine surveys will continue to be conducted monthly to determine the temporal and spatial rearing extent of juvenile steelhead and salmon. Survey sites range from Hatchery Ditch to Boyd Pump boat ramp. Beach seine surveys indicate that a small number of salmon (5,000-15,000) remain in the river throughout the summer and probably migrate in the fall. Beach seining also reveals that few steelhead rear for any length of time below the Thermalito Afterbay Outlet.

5.3.2.3 Rotary Screw Trap Sampling, Fyke Sampling, Hatchery and In-Channel Coded Wired Tagging

Rotary screw fish traps will continue to be placed at two locations in the Feather River to monitor the timing and number of chinook salmon emigrants (see Figure 4.5.4-1). As a component of screw trap sampling, we will continue to tag naturally produced fall-run chinook salmon with a coded wire tag to determine their return success compared to hatchery releases. As fish return over the next several years, we will analyze these data. The DWR tagged approximately 65,000 juvenile salmon in 1998, 135,000 in 1999, and 150,000 in 2000. The DWR expects to tag approximately 150,000 to 200,000 juvenile salmon in 2001.

The DWR has also investigated the production of juvenile salmon and steelhead from a small side channel called Hatchery Ditch. In the 1999/2000 emigration period, the DWR trapped approximately 94,000 juvenile fall chinook in Hatchery Ditch. Trapping will continue throughout the 2000/2001 emigration period.

5.3.2.4 Egg Survival Studies, Spawning Aerial Surveys

Spawning aerial photographs, along with in-channel egg survival studies, provide information on the amount of habitat used for spawning and the relative egg survival at different river reaches. Egg survival studies conducted by the DWR in 1998 and 1999 revealed that survival is reduced as salmon move upstream (Kindopp 1999). The main cause for the reduction in survival may be egg superimposition caused by the large number of adults crowding into the Low Flow Channel. The number of spawning chinook salmon (in most years) greatly exceeds the amount of habitat available. For example, 1999/2000 emigration data from Hatchery Ditch (a small side channel in the LFC) reveal that the actual survival from egg deposition to emergence from the gravel

may only be between five and 15 percent (DWR unpublished data). Egg superimposition is clearly reducing survival due to the high number of adult spawners in such a small area (approximately 2,000 female and 1,300 male fall-run chinook were estimated to have died in Hatchery Ditch in 1999, while only 1,000 females actually spawned).

5.3.2.5 Spawning Escapement Surveys

Past chinook adult escapement (carcass) surveys have been conducted by DFG. Estimates of the spawning run range from a low of 10,000 in 1979 to a high of 86,000 in 1955. When compared to pre-project (Oroville Dam) estimates, the 1969-1989 period is somewhat stable. Pre-Oroville Dam estimates ranged from roughly 10,000 salmon in 1953 to 86,000 in 1955 (DWR 1992). The stability seen post Oroville Dam is likely due to hatchery influence. Pre-1967, all chinook salmon in the Feather River spawned in the river. Estimates for the number of wild chinook spawning in the Feather River since project construction are not available. Escapement estimates of adult chinook since project completion have included both wild and hatchery salmon that spawned in the river. As coded wire tag data are recovered over the next several years, more information will be gained on the number of wild chinook spawning in the Feather River. The DWR and DFG are working to refine adult chinook escapement estimates.

5.3.2.6 Redd De-Watering and Juvenile Stranding Surveys

Because the Oroville Dam-Thermalito Complex often varies flows for water operations and Delta requirements, there is concern about the impacts this may have on redd de-watering and juvenile stranding. Each year on October 15, the flows in the Lower Reach of the Feather River (below Thermalito Afterbay) are reduced, dewatering some redds. Recent studies conducted by the DWR demonstrate two very important points: (1) the great majority of fall-run chinook spawn in the Low Flow Section of the river and are therefore not subjected to redd-de-watering; and (2) some redd de-watering does occur in the Lower Reach but is very small when compared to total run size (approximately 0.3-1 percent of the redds are de-watered, depending on the number of spawners in any given year and the timing of spawning).

Additionally, juvenile stranding (in off-channel ponds) can occur during high flow events and even during normal operations. Some stranding has occurred within normal river operations but is typically associated with higher flow events (>25,000 cfs). The DWR has substantially increased its effort to evaluate both juvenile stranding and redd de-watering. The DWR will also revisit the ramping criteria (how fast the flows are reduced

at the Thermalito Afterbay Outlet) to determine the benefit of adjusting it to allow juveniles to move out of potential stranding areas as flows are dropped.

5.3.2.7 Steelhead Self Creel Surveys

The DWR is currently working with several local anglers to gather more detailed information on the life history of adult steelhead in the Feather River. Data collection includes the size of fish caught, whether the fish are wild or of hatchery origin, general coloration, and whether the fish are kept or released. There may be two runs of steelhead in the Feather River, but more data are needed to assess this. Angler surveys will continue in 2001.

5.3.2.8 Invertebrate Research

To learn more about what may be limiting to juvenile steelhead in the lower Feather River, the DWR, in cooperation with California State University, Chico, is conducting an invertebrate study. There are three main goals of this study: (1) to determine if there are differences in the invertebrate populations above and below the Thermalito Afterbay Outlet; (2) to determine if there are differences in invertebrate populations between the main channels and nearby side (secondary) channels; and (3) to examine stomach contents of juvenile salmon and steelhead to determine their diet preferences. This work began in June 2000 and will continue until June 2002.

5.4 TERRESTRIAL RESOURCES

DWR anticipates that additional information will be collected in the following terrestrial resource areas:

- Information on sensitive species occurrence and distribution within the project area;
- Information to develop a vegetation/habitat map for the project area; and
- Information on recreational wildlife use within the Oroville Wildlife Area and State Parks lands.

5.5 CULTURAL RESOURCES

Under Section 106 of the National Historic Preservation Act (NHPA) and FERC regulations, the relicensing applicant (DWR) is required to inventory archaeological, historical, and traditional cultural resources; evaluate their eligibility for listing in the

National Register of Historic Places (NRHP); describe project impacts to any such historic properties; and implement measures to avoid, minimize, or mitigate the project impacts to those properties. This work will be conducted in consultation with the cultural resource oversight agencies, State Historic Preservation Office (SHPO), and the National Park Service; federal and state land management agencies (including the USFS, BLM, and DPR); Indian Tribes and groups; and other concerned stakeholders.

DWR plans to document the Oroville Facilities (e.g., dam, powerhouse, etc.) to determine if they are eligible for listing on the NRHP. Given their important contribution to the historic, social, and economic development of the state, it can be anticipated that the research results will indicate that the Oroville Facilities represent the significant historical and cultural values that warrant nomination to the NRHP.

One of the primary goals of the cultural resources program is to provide FERC with an inventory of archaeological, historical, and traditional sites that will be affected by direct and indirect impacts of project operations. Focus areas for cultural resources surveys are expected to include reservoir operation shoreline fluctuation and boat wake zones, recreation areas, and project facilities and areas that may be affected by construction, operation, and maintenance such as transmission corridors and access roads.

The Stage I Survey is expected to include a review of the pertinent archaeological, historical, and ethnographic literature; analysis of the locales of project facilities and recreation areas; and field visits to identify impact areas and to assess their potential for containing sites. The results of the Stage I Survey will determine the type of Stage II work to be conducted.

The Stage II Survey may include a comprehensive on-foot inventory of impact areas that have a reasonable possibility for containing sites. This study phase may also include any additional field investigations, such as subsurface testing necessary to determine resource eligibility to the NRHP. Detailed descriptions of project impacts to National Register eligible sites may be an important component of this study phase.

The ultimate objective of the cultural resources program is to develop a detailed, consensus-based Cultural Resources Management Plan that provides measures for avoiding or mitigating impacts to significant sites due to project operation or new development.

5.6 RECREATIONAL RESOURCES

FERC requires that licensees develop a recreation plan that addresses existing and future public recreation needs associated with the project through the term of the new license. DWR proposes to develop this plan through the Recreation Work Group.

To develop this plan, several sequential tasks would be involved to address important project issues and satisfy relicensing participant concerns. Though not a comprehensive or final list, this effort would typically include the following studies.

5.6.1 Recreation Supply Analysis

The recreation supply analysis would describe existing recreation resources in the study area. This information would be used, along with other studies, to determine if these resources need to be better maintained, improved, or expanded based on an analysis of their current and anticipated future condition.

5.6.2 Recreation Surveys

Recreation surveys would be used to elicit responses from respondents about recreation opportunities at Lake Oroville. These data would be used to assess existing demand and use levels, assess visitor attitudes and preferences, and develop protection and enhancement measures.

5.6.3 Recreation Demand Analysis

This analysis would compile and estimate existing and future visitor demand for recreation opportunities and resources within the study area. The results of the recreation surveys, along with a regional recreation demand analysis, would be used to present recreation demand in the study

5.6.4 Recreation Capacity and Suitability Analysis

This analysis would investigate the existing capacity of recreation resources and determine whether recreation enhancements and activities are suitable in the study area while maintaining the integrity of the resources and meeting the long-term needs of visitors.

5.6.5 Recreation Needs Analysis

The recreation needs analysis would identify and project existing and future recreation needs in the study area. Results would be used to analyze the potential effects of hydropower development and operations on recreation resources and to develop protection and enhancement measures based on these needs.

5.6.6 Recreation Resources Management Plan

The Recreation Resources Management Plan (RRMP) would be developed based on the recreation needs analysis and balancing of other resources and project objectives. The RRMP would clearly identify DWR recreation resource responsibilities and phased costs over the term of the new license.

5.7 SOCIOECONOMICS

5.7.1 Issues

Perhaps the key socioeconomic issue for project relicensing is understanding how existing and potential changes in recreation activity associated with use of the LOSRA affects the local and regional economy, including businesses and local governments. This issue involves defining key socioeconomic relationships, including how existing recreation facilities and improvements, access, and water and fishery conditions affect recreation use levels, as well as how recreation use levels, in turn, affect visitor spending, employment, personal income, and tax revenues in the local and regional economy. A comprehensive understanding of these relationships may allow for evaluating the socioeconomic impacts of different operating and facility development scenarios, and for developing effective strategies to enhance economic development in the region.

A secondary socioeconomic issue pertains to potential economic benefits from using water stored at Lake Oroville for local municipal, industrial and agricultural purposes. This issue involves identifying potential institutional and legal constraints on local use of water stored at Lake Oroville, as well as evaluating the economic value of potentially using stored water for these purposes.

5.7.2 Studies

To address recreation-related socioeconomic issues, several baseline studies are anticipated. Historical and current conditions related to recreation and tourism activity in the region would be documented. Historical data on visitation to the LOSRA would be

compiled and evaluated to identify important use trends. These data would be supplemented with additional recreation use information that provides details on where and when recreation use occurs at the LOSRA, the distribution of use by activity, and user characteristics.

Considerable information was collected in user surveys conducted by California State University, Chico in 1996; however, because of concerns about the validity of the information collected, the methods and data would be closely reviewed and evaluated. It is likely that new recreation user surveys may be needed to obtain information not collected in the 1996 surveys, such as more detailed information on visitor spending, patterns and contingent use questions (i.e., how would visitation change if improvements were made to recreation facilities or if water and fishery conditions were enhanced?). As a consequence, additional survey data on visitation, spending, and visitor opinions about facility conditions and improvements may also be collected to validate and/or supplement data collected in the 1996 user surveys.

In addition to visitor surveys, local businesses that provide goods and services to visitors to the LOSRA may be surveyed to identify important purchasing patterns and labor characteristics. This information will help to better understand the impact on the local and regional economy associated with potential increases in recreation use levels. Data derived from business surveys are very useful in evaluating impacts at the local level because "off-the-shelf" economic impact models (e.g., IMPLAN) consider effects only at the county or multi-county level.

Lastly, data may be collected from local government (i.e., cities, counties, unincorporated communities, and special districts) to better understand the fiscal implications of recreation activity at the LOSRA. Procedures for collecting and distributing tax revenues (e.g., sales taxes, lodging taxes, property taxes, and business taxes) generated by visitors to the Lake Oroville and by residents may be documented. Local revenue and public service officials may be interviewed to identify the mechanisms used to collect and redistribute tax revenue.

5.8 LAND MANAGEMENT

5.8.1 Issues

The primary issues affecting project lands adjacent to Lake Oroville are related to the expressed desires of local governments, businesses, and residents for more development

of visitor-attracting recreational facilities that capitalize on the recreational potential of Lake Oroville. While primarily a recreational issue, there is a land management component in terms of the compatibility of potential new recreational development with adjacent land uses. The potential for land use conflicts, as well as opportunities, are present surrounding Lake Oroville.

Below Lake Oroville, the potential land use issue concerns the relationships between the Feather River, Feather River Fish Hatchery, Thermalito Canal, Forebay, Afterbay, and related power generation and recreational facilities with adjacent land uses in the City of Oroville and the surrounding unincorporated portions of Butte County on the city's fringes.

For example, Oroville residents have expressed the desire to improve the amenity value of the portion of the Feather River bypass reach that flows through the city. The community is looking for funds to improve the now largely undeveloped lands at Riverbend Park. In downtown Oroville, there has been a recognition of the potential to use urban design measures to open up views toward the river and to make it more of a focus and positive attraction to the city center. Land use compatibility and opportunities for coordination with the City of Oroville and Butte County are land management issues in the project area.

Other issues include the land use compatibility between new single-family residential development around the Thermalito Afterbay and the adjacent Oroville Wildlife Area. Public access, exotic weeds, and mosquitoes are issues that will likely arise as additional development in these areas is permitted by the county.

Finally, there is an issue of rightful land ownership between the state and local Native Americans in the project area. The Spencer Cemetery, located on state lands within the Craig Saddle area, has been a used for Native American and non-Native American burials in the past. This area is also considered a culturally significant, sacred place by local Native Americans. While the state currently manages this area and is aware of its cultural significance, Native American groups would like the cemetery returned to the local tribal government for their ownership and management.

5.8.2 Studies

To address land management issues, several baseline land use studies may be conducted. The studies would begin with an inventory of existing land uses in the project area beginning with a review of land use maps developed by Butte County, the USFS, DWR, and other government agencies; a review of aerial photography; and a field visit. Existing land uses would be placed into categories, including but not limited to: industrial/project facilities, recreation (including two to three subcategories), undeveloped open space, residential, commercial, and transportation (roads, trails, parking lots). These areas would be mapped and quantified using available geographic information system (GIS) coverages. Vegetation cover type mapping may also be utilized to identify and quantify developed/undeveloped lands.

Another study could include an identification and description of existing land use agencies with jurisdiction, applicable regulations, and management plans. Land management areas, jurisdictions, and ownership would be mapped and quantified using GIS, and then described. These would include areas owned and managed by DPR, DFG, USFS, BLM, Butte County, and the City of Oroville. A descriptive summary of zoning, other regulations, and comprehensive management plans and policies with study area coverages would be developed from a review of these federal, state, and local regulations and comprehensive management plans. These land use plans may include, but are not limited to, the following:

- Recreation Plan for Lake Oroville State Recreation Area, (DWR)
- Plumas National Forest Land and Resource Management Plan (USFS)
- Redding Resource Management Plan and Record of Decision (BLM)
- Resource Management Plan and General Development Plan, Lake Oroville State Recreation Area, 1973 (DPR)
- Oroville Wildlife Area Management Plan, 1978 (DFG)
- Butte County General Plan
- City of Oroville General Plan and Land Use Maps

Another study could include a review and summary of the project area's natural and sensitive resources, including wetlands and floodplains information, sensitive biological habitats, and prime and unique farmlands which may act as land use constraints to future development. For this task, coordination with the biological resource studies would take place. These areas would be mapped in GIS.

The land use study would also coordinate with any recreational resources studies, specifically, the Shoreline Management Plan (SMP). Compatibility between future shoreline development and adjacent land uses would be summarized. The land use study would also coordinate with the cultural resource studies to identify land use and ownership as related to the Spencer Cemetery in the Craig Saddle area.

A matrix could be developed that compares land use compatibility in terms of high, medium, and low compatibility for both exiting development as well as recommended new improvements. Incompatible land uses (low compatibility) or areas of conflict would be further described and mapped as necessary to highlight this key land use issue. The potential effects of proposed land use changes as a result of the project could also be evaluated.

5.9 AESTHETICS

5.9.1 Issues

An important aesthetic issue for project relicensing is the need to address the phenomenon of highly contrasting areas of exposed shoreline that accompany reservoir drawdowns. A better understanding is needed of the extent and ways in which the exposed shoreline areas created by drawdown affect the perceptions of visitors and their aesthetic enjoyment of the project environment. Related issues important to understand include the impacts of the aesthetic effects created by drawdowns on recreational activities and levels of project area visitation. With the increasing attention that the City of Oroville is paying to the amenity values of the areas along the Low Flow Section of the Feather River, the maintenance of aesthetic flows in this reach of the river may also be a concern.

In general, project facilities are well designed and well maintained and do not appear to be a source of major aesthetic issues. However, there may be some specific areas with localized visual issues and concerns that can potentially be addressed by landscape treatment or other enhancements. For example, the City of Oroville and Butte County have been paying increasing attention to the developed and developing areas in the vicinity of the Feather River Low Flow Section, the Fish Hatchery, Thermalito Canal, Thermalito Forebay and Thermalito Afterbay; in addition, interest has been expressed in landscape improvements in these areas. A specific case in point is the area that lies to the south of the Thermalito Forebay where there has been increasing residential

development. In this area, there may be a rationale for landscape improvements along some edges of the facility. Desires have been expressed for more landscape improvements at recreational facilities around the Thermalito Afterbay, similar to those that have been made at the Monument Hill Recreation Area. Concerns have been also expressed about the need to improve the appearance of project-related transmission lines. Given the more general interest in increasing levels of visitation at the project and visitor spending in the project vicinity, it may be desirable to identify opportunities to enhance the appearance of existing project recreational and visitor facilities and to identify opportunities to highlight and improve the accessibility and amenities of aesthetic resources that may now be under appreciated. In addition, to the extent to which additional recreational facilities are planned, there would be a need to select their sites and design them in a way that takes advantage of the project area's scenic assets and minimizes any negative impacts on them.

5.9.2 Analyses of the Aesthetic Consequences of Variations in Reservoir Levels and Streamflow

To address the aesthetic issues associated with variations in reservoir levels and in flows in the Low Flow Section of the Feather River, it may be appropriate to undertake studies to:

- Provide a basis for understanding the aesthetic consequences of variations in reservoir levels, the degree to which these fluctuations are a source of aesthetic concerns to the public, and the public's aesthetic evaluations of varying water levels;

- Identify any specific segments of the Low Flow Section that may be visually important and visually significant, assess the aesthetic consequences of variations in stream flows in the critical segments, identify the degree to which these variations in stream flow are a source of aesthetic concern to the public, and assess the public's aesthetic evaluations of the varying flows; and

- Provide a basis for identifying reasonable and cost-effective lake level and streamflow management and shoreline and drawdown area vegetation management measures that enhance project area aesthetics while meeting other project power production and resource management objectives.

Analyses of the aesthetic effects of fluctuating water levels in project reservoirs and varying flows in the Feather River Low Flow Section need to be conducted following a systematic approach that:

- Documents the frequency and timing of varying reservoir levels and streamflows;
- Uses still photography and videotaping to document reservoir and stream appearance from sensitive viewing areas at varying water levels and flows; and
- To the extent required, uses a variety of social science research techniques to establish the public's evaluation of the aesthetic quality and aesthetic acceptability of the varying reservoir levels and flows.

Establishment of the public's perceptions of the varying reservoir levels and streamflows could include focus groups and surveys. The focus group sessions could include small groups of people from the Oroville area and from the larger region from which project visitors are drawn. The goal of these sessions would be to develop an in-depth understanding of how visitors use, experience, and evaluate the recreational and aesthetic qualities of the project and its setting. The sessions could include a mix of facilitated discussions and photo sorting exercises. The insights generated by the focus group sessions could be applied to develop aesthetic items to be used in special surveys of visitor aesthetic preferences and in aesthetic-related items in the visitor surveys.

The surveys could include items that ask respondents to evaluate the aesthetic qualities and acceptability of the reservoirs at varying water levels and the Low Flow Section at varying flows. The value of the focus group sessions is that they could help identify issues and concerns of interest to the general public, as well as develop survey items structured and worded in a way to be consistent with public perceptions related to the issues.

5.9.3 Analyses of the Project's Relationship to the Project Area Landscape

The need for studies of the project area's landscape and aesthetic setting, and of the relationship of the project's elements to it, is driven in part by FERC's requirements that the Exhibit E describe measures that the applicant is proposing "…to ensure that any proposed project works, rights-of-way, access roads, and other topographic alterations

blend, to the extent possible, with the surrounding environment" (18 CFR Ch.1, 4.51 (f) (6) (ii).

To meet FERC's requirements and provide a basis for identifying project aesthetic enhancements, it may be appropriate to undertake studies that would:

- Develop a baseline description of landscape and aesthetic conditions in the project area to provide a context for considering the project's implications for the aesthetic character and quality of its setting, and to provide a database that can be drawn on in identifying optimal sites for any additional visitor facilities.

- Assess the extent to which project facilities are visible, are located in visually sensitive areas, fail to "blend" with the surroundings, and create aesthetic problems that of concern to the public.

- Identify and evaluate mitigation measures that would be cost-effective in either ameliorating the appearance of any project features found to inadequately blend with their surroundings or to enhance the aesthetic experience of visitors.

The methods that could be used in implementing these studies could include:

- Mapping of the project area's landscape units and assessment of the visual character and quality of those landscapes, applying the principles of the newly adopted United States Forest Service Scenery Management System (SMS) (US Department of Agriculture Handbook Number 701). To the extent possible, this analysis would draw on existing landscape evaluations prepared by the Plumas National Forest and other land management agencies. The available data would be supplemented to the extent necessary by analysis of aerial photos and cartographic sources and highly targeted field observation and photo documentation.

- Plotting of the landscape data on GIS layers that would allow the data to be readily analyzed and readily related to other kinds of information. The viewsheds of major project facilities, reservoirs and stream channels could be defined using the GIS viewshed mapping system and the viewshed boundaries so delineated will be verified through selective field checking.

- Strong links could be made between the study plans for the aesthetics and the study plan for recreation. Data on recreational use patterns, and the perceptions of recreational users could be collected in a way that makes it useful for informing the selection of important viewing areas and the identification of aesthetic issues of concern to the area's recreational visitors.